NDIA 8th Annual Expeditionary Warfare Conference

23 October 2003

Arthur W. Divens
Executive Director
Amphibious & Auxiliary Ships,
PEO Ships

FLEET SUPPORT

Arleigh Burke Class

Ticonderoga Class

LPD Austin Class

Oliver Hazard Perry Class

- Ships: 187
- Classes: 19
- Drydocks: 4
- Homeports: 16
- Availabilities per year:

-92 execution

-90 planning

Spruance Class

LHD Wasp Class

Osprey Class Minesweeper

LSD Whidbey Island Class

LCC Blue Ridge Class

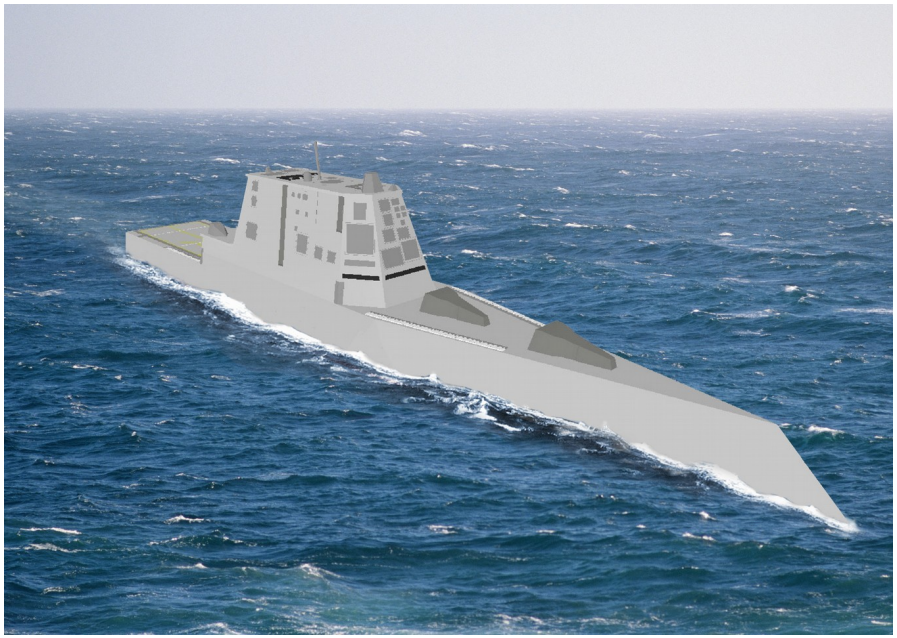
Avenger Class Minesweeper

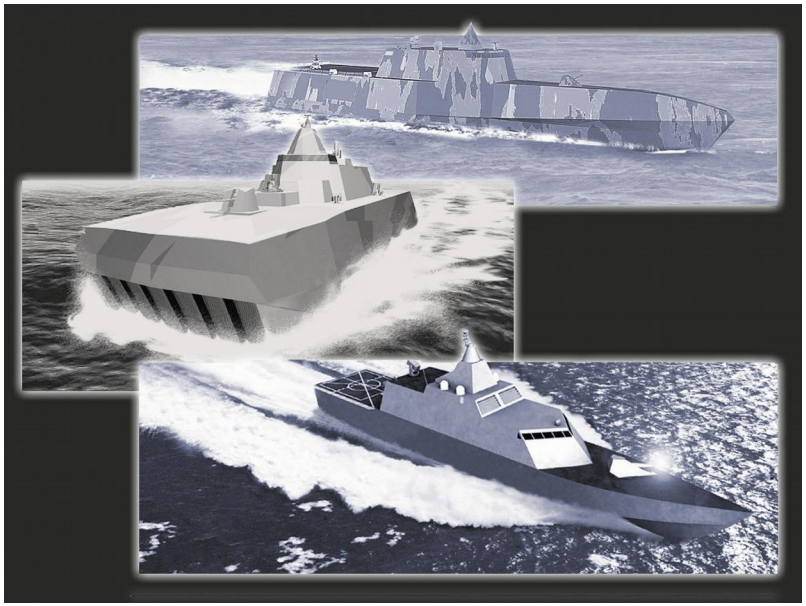
LHA Tarawa Class

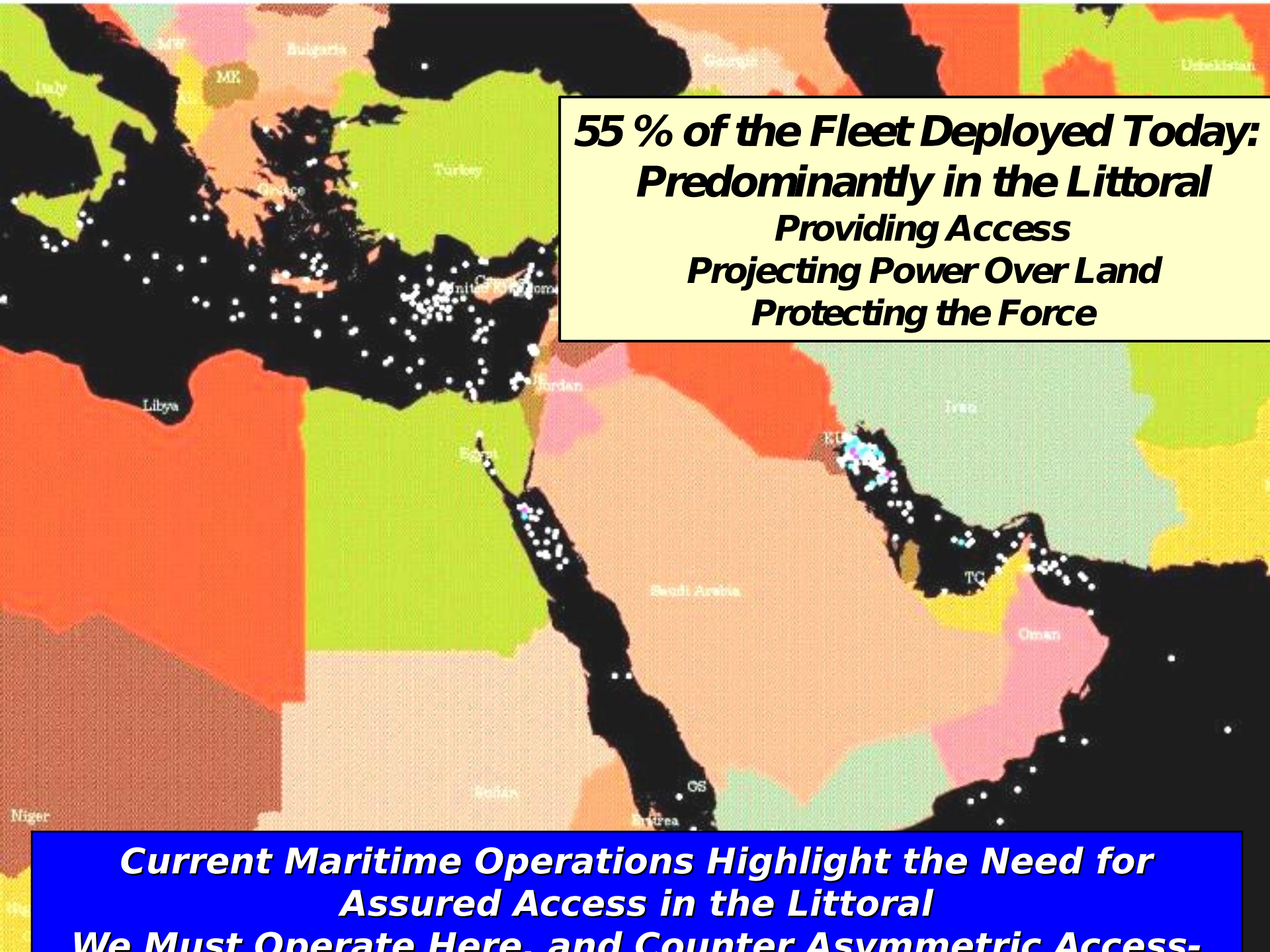
LSD Harpers Ferry Class

Amphibious and Auxiliary Ships

Combatants






55 % of the Fleet Deployed Today:
Predominantly in the Littoral
Providing Access
Projecting Power Over Land
Protecting the Force
Current Maritime Operations Highlight the Need for
Assured Access in the Littoral
We Must Operate Here, and Counter Asymmetric Access-
Italy
MK
Bulgaria
Georgia
Uzbekistan
Turkey
Greece
Libya
Jordan
Iran
Egypt
KU
TG
Saudi Arabia
Oman
OS
Eritrea
Sudan
Niger

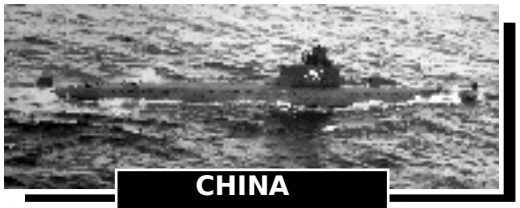
Anti-Access Threats

Mines

- 275,000 Threat Mines Worldwide
- More damage to U.S. ships than all other weapons combined over last 50 years
- Remote Controllable

Submarines

- 43 Countries/ 400+ Subs Worldwide
- Quieter Diesels



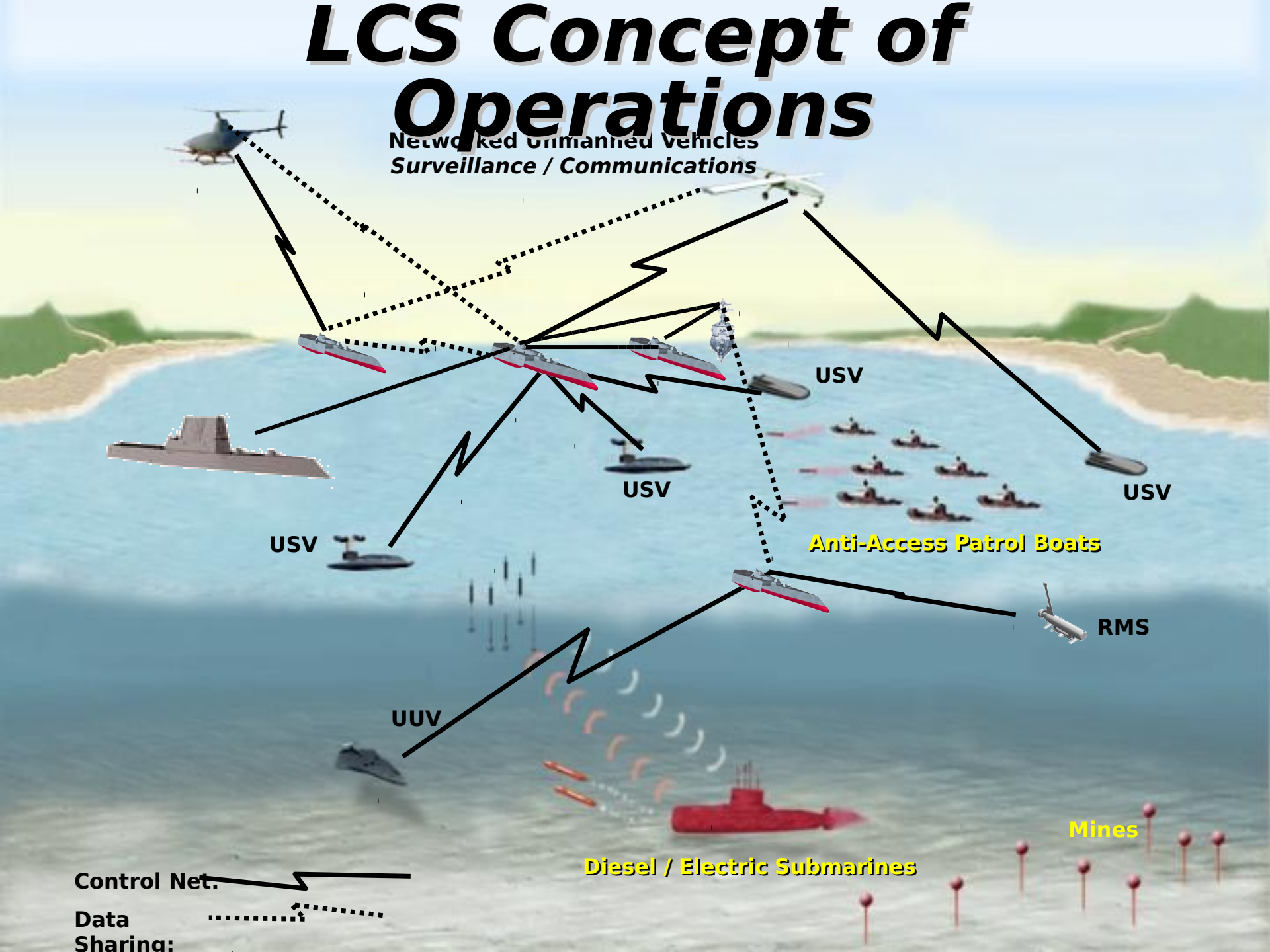
Small Boats

- Attacks pose a significant threat to deployed naval assets operating in the littorals, demonstrated on a

Littoral Combat Ship

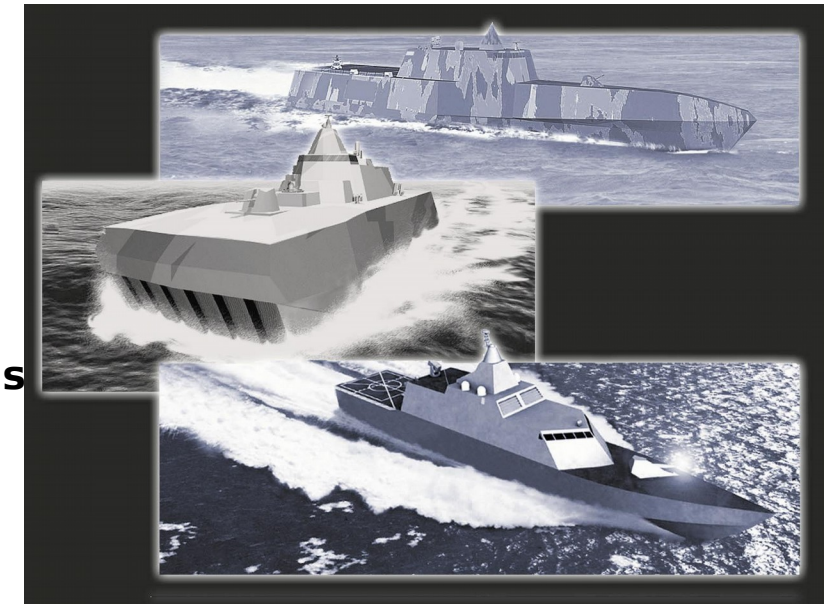
- **A focused mission ship designed to optimize warfighting in the Littoral Battlespace**
  - **Fast**
  - **Maneuverable**
  - **Shallow Draft**
- **Capable of countering enemy asymmetric littoral threats**
  - **Mines**
  - **Small fast surface craft**
  - **Diesel submarines**
- **Self deploying and self sustaining ship**
  - **Not a small craft**
  - **Significantly smaller than DD(X) or CG(X)**
- **Innovative hull form / propulsion**
- **Modular mission payloads with Open Systems Architecture**
  - **Mission payloads to provide sensors and combat systems**
  - **Will incorporate advanced unmanned air, surface and underwater vehicles**
  - **Fully netted with the battle force**
  - **Draws upon the capabilities and fire power of multi-mission ships**

LCS Concept of Operations



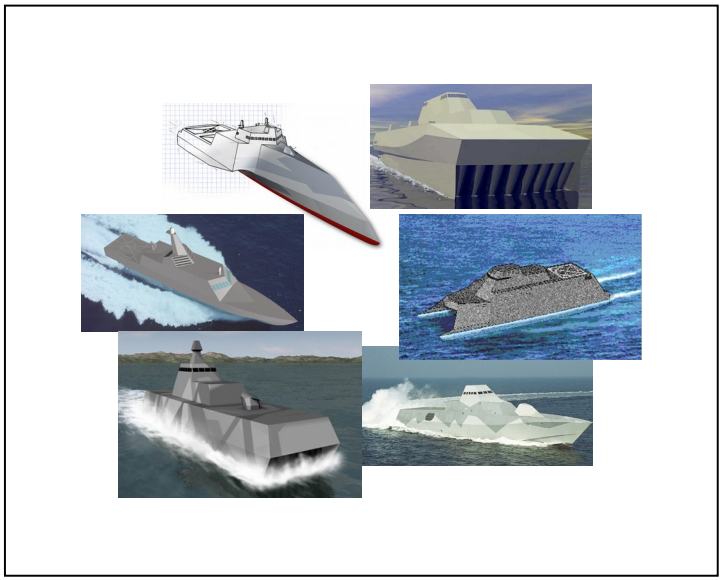
LCS: Seaframe

- **Attributes - Balance of Mission Payload, Capacity, Maneuverability, Stealth and Survivability**
  - **Draft of 20 feet or less**
  - **Innovative Hull Form and Propulsion System**
    - ★ **Economical loiter speeds**
    - ★ **Sustained Battle Group transit speeds**
    - ★ **High speed sprints of 40-50kts**
    - ★ **Potential Common Technologies:**
      - » **USCG Deepwater Project Offshore Patrol Vessel**
      - » **FMS**
  - **Signature – Management Technologies to minimize**
    - ★ **Infra-red, acoustic, magnetic, radar and wake emissions**
  - **State-of-the-art Damage Control Technology and Self-Defense Systems**
  - **Mission manned**



LCS Road Ahead

6 Industry Concepts
(06 Feb 03)



3 Preliminary Designs
(19 Jul 03)

1 or 2 Final Design(s)
(Contract Award April 2004)

Flight 0 Construction Start
(Contract Award January 2005)

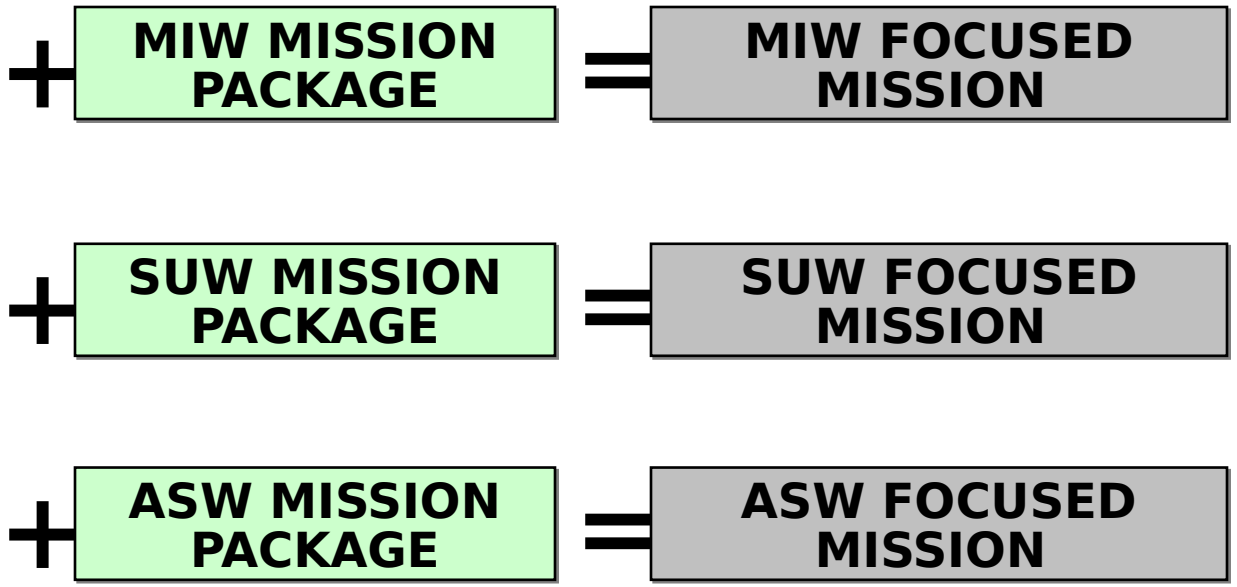
February 2003 — ***July 2003*** — ***April 2004*** — ***January 2005***

First Ship in the Water in 2007

Core Systems & Focused Mission Packages

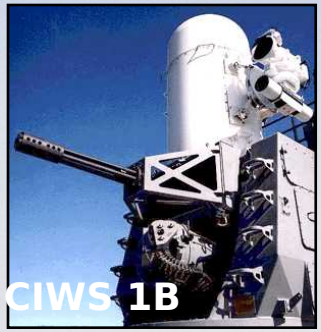
CORE SYSTEMS

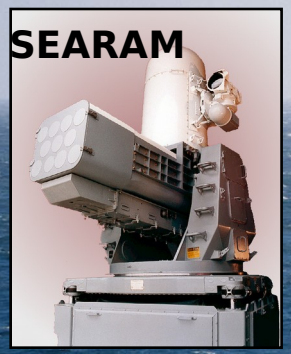
- Self Defense
- Navigation
- C4
- Mine Avoidance
- Torpedo Detection & Avoidance
- Warning Shots
- Detect, ID, & track Surface Contacts
- Limited ISR
- Core Crew

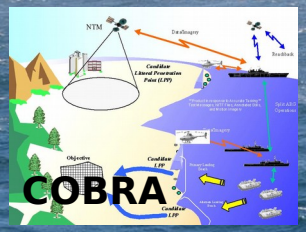


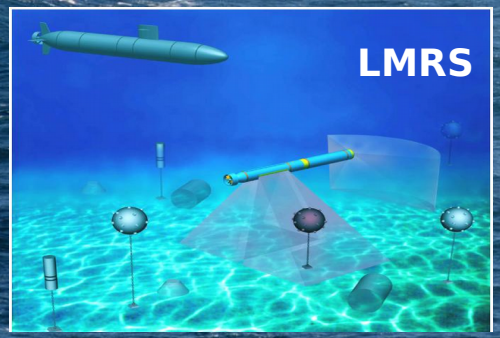
BACKUP

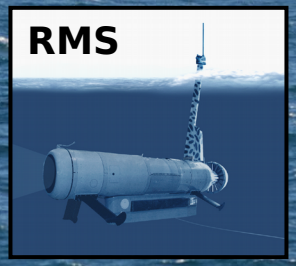
Mission System Packages That Can fill the Gap











Analysis of Systems vs Capability Gaps will Identify Optimal System

Foundation of LCS Concept and Requirements

- LCS emerged as a result of:
  - Evolving threats, new employment concepts and missions,

all based on:

Joint Vision 2020…directed the Services to provide the Joint Force Commander ***the right*** personnel, equipment, and ***supplies in the right place, at the right time, and in the right quantity, across the full range of military operations.***

National Security Strategy said…***transform*** military forces and ***combat capabilities***

Defense Planning Guidance…established a ***new framework*** for change in warfighting capability…***1-4-2-1***

Sea Power 21…described ***what*** capabilities were required of the 21st Century ***surface combatants***

Navy/Marine Corps Global ConOps…described ***how*** the Navy (including LCS) will be ***deployed***

NWDC ConOps…articulated how LCS would be employed

LCS Mission Analysis…***validated*** LCS requirements

Naval Operating Concept…charted way ahead in the near, mid and far term…***including the integration plan fo***

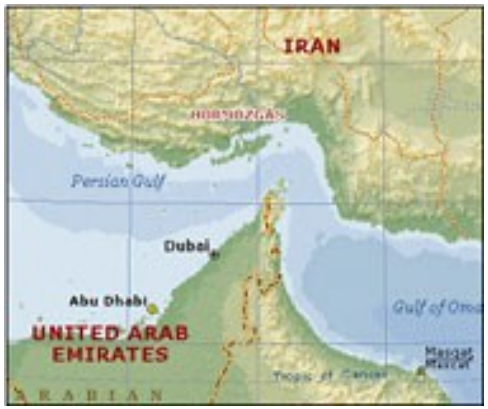
Analysis
Quantified Capability Gap…

Western Pacific Maritime Conflict

- **Anti-submarine Warfare**
  - **Current force:** Acoustic sensor grid needed – requires protracted time to deploy; larger number of ships and air assets needed to respond to ASW threat
  - **Need:** Improved detection, surveillance and prosecution; reduction of torpedo threats

SWA Littoral Chokepoint Conflict

- **Surface Warfare**
  - **Current force:** Insufficient ship speed, close-in firepower and organic anti-Fast Patrol Boat air capability against massed, small attackers
  - **Need:** Substantial kills, improved defense of High Value Units; free multi-mission combatants to other roles
- **MIW**
  - **Current force:** Minehunting is time consuming and asset intensive. Current MCM force cannot support organic systems
  - **Need:** ESG / CSG capable platform; ability to operate more systems to hasten acceleration Q-route

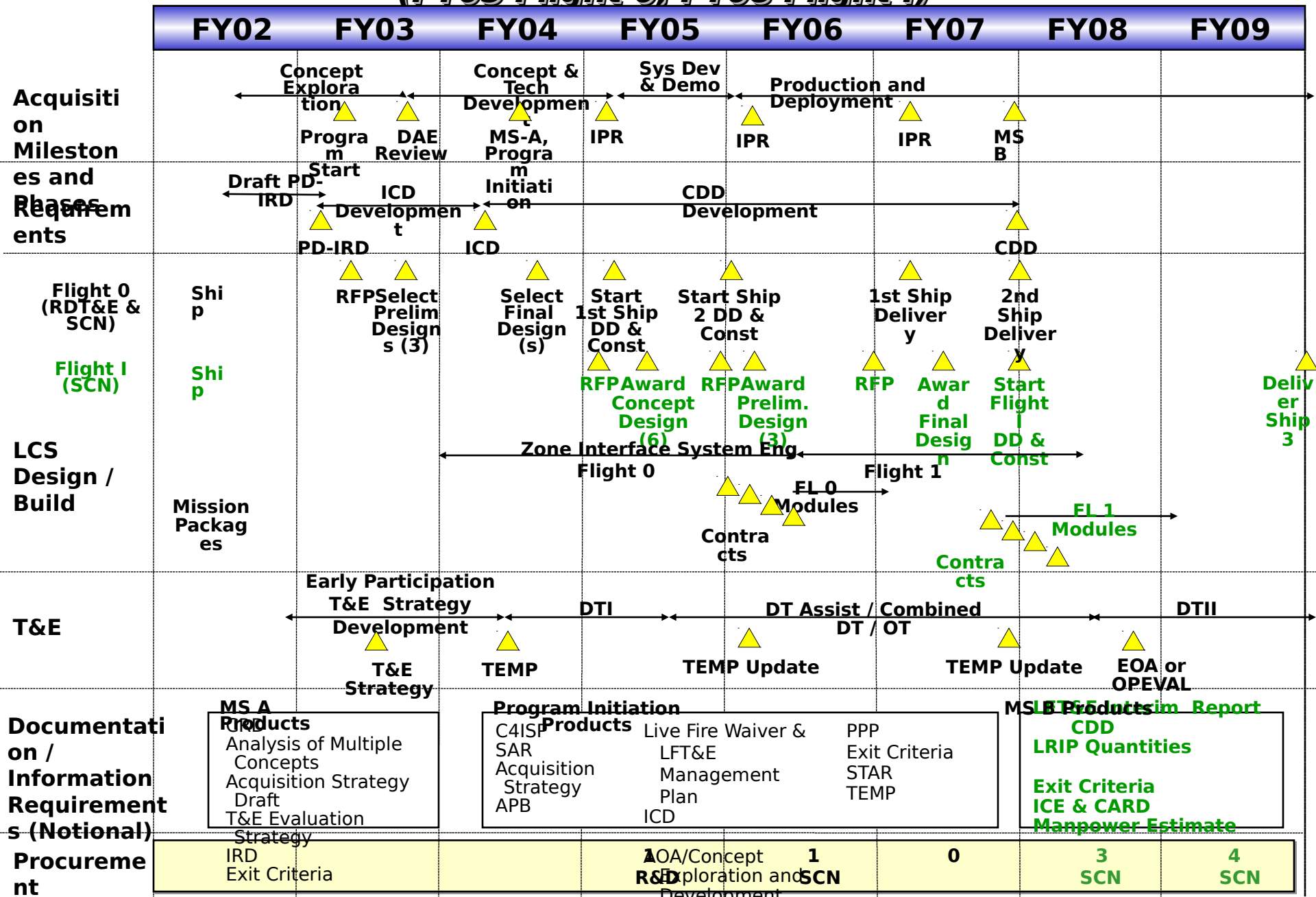


Potential Value of Small, Fast Delivery Pl

Mid-term Schedule

- **Preliminary design 17 Jul 03 – 11 Feb 04**
- **1st update / contract modification for option items 15 Oct 03**
- **Final update / contract modification for option items 01 Dec 03**
- **Industry submit proposals for next phase 31 Dec 03**
- **Downselect to one or two for final design 03 May 04**
- **Exercise 1st construction option 18 Jan 05**
- **Exercise 2nd construction option 31 Dec 05**

LCS Integrated Schedule
(FY05 Flight 0, FY08 Flight I)



Program Status

- ☑ **23 Feb 02** **ASN(RDA) directed establishment of LCS Program**
- ☑ **08 Jul 02** **N76 letter provided interim direction to PEO(S) on top level objectives for exploratory studies for Family of Ships concept**
- ☑ **14 Aug 02** **RFP released for Ship Concept Studies**
- ☑ **17 Sep 02** **Establishment of LCS Program Office (under PEO(S))**
- ☑ **08 Nov 02** **Contract award for Family of Ships Concept Studies (focused- mission high-speed ship)**
- ☑ **15 Nov 02** **Congressional New Start approval for Littoral Combat Ship Program ($30M Congressional Plus-up)**
- ☑ **28 Feb 03** **Planned solicitation for LCS Flight 0 preliminary designs**
  - **Receipt of proposals 14 April 03**
  - **Proposal evaluation 15 April-13 July 03**
  - **Contract(s) Award 17 July 03**

FY05 Construction Start Acquisition Strategy

- **Two step process to award first ship in FY05**
  - **Downselect to three industry teams to prepare preliminary designs**
  - **Source selection panel selects preliminary design(s) for Detailed Design and Construction**
- **Ship size allows smaller shipyards to facilitate ship development and procurement which is conducive to multi-national and US collaboration and teaming**
- **LCS to be procured in flights with follow-on ships incorporating new technologies through spiral development**

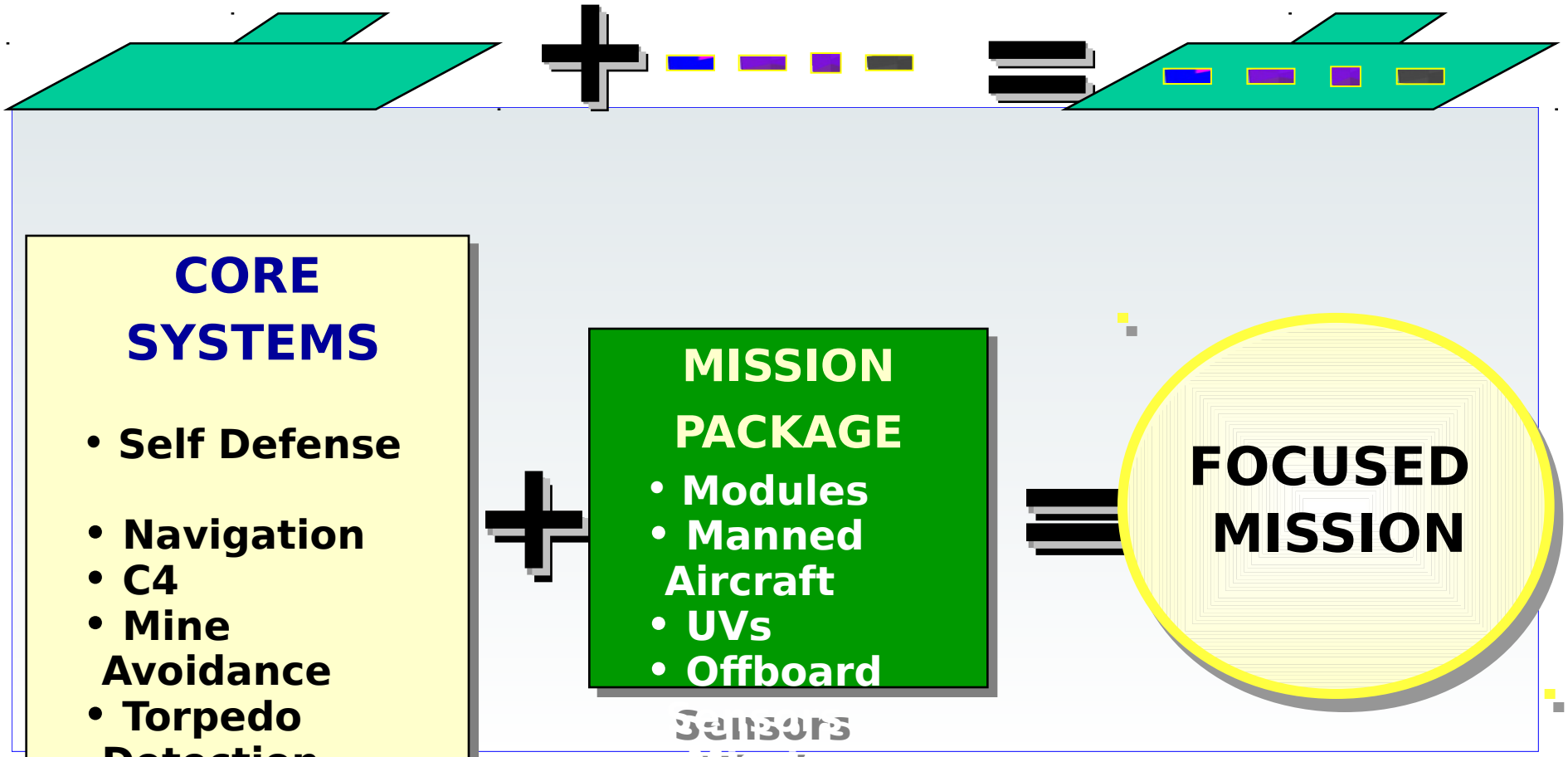
LCS Flight 0 Mission Packages

- Two “facets” to LCS Flight 0 Mission Package funding
- PB04-based
  - $463M of original LCS request removed post-PBCG
  - Reduced Mission Module funding; $177M procurement remains
  - Funding initiates in FY06
  - Permits acquisition of rudimentary packages for Flight 0:
    - ★ MIW package ship 1
    - ★ ASW package ship 2
- PR05-based
  - Mission Module funding restoration for MIW, ASW, SUW package
  - Accelerates acquisition
    - ★ MIW package for Ship 1 (FY07 delivery)
    - ★ ASW package for Ship 2 (FY08 delivery)
    - ★ SUW package for Ships (Full delivery FY08)
- Mission Module Offsite process basis for both approaches

Modular Approach

- LCS Seaframe modular in architecture
- Enables multiple “focused” missions to be accomplished with use of modular mission packages
  - Primary, secondary & possible future missions
  - Separate acquisition from core Seaframe
- Common core mission and HM&E systems and adapters to support multiple modules
  - Enables ability to reconfigure, refocus, and adapt
- Integration via standard interfaces (technical architecture) developed to support current and future technologies

Core Systems and Mission Packages



CORE SYSTEMS

- Self Defense
- Navigation
- C4
- Mine Avoidance
- Torpedo Detection & Avoidance
- Warning Shots
- Detect, ID, & Track

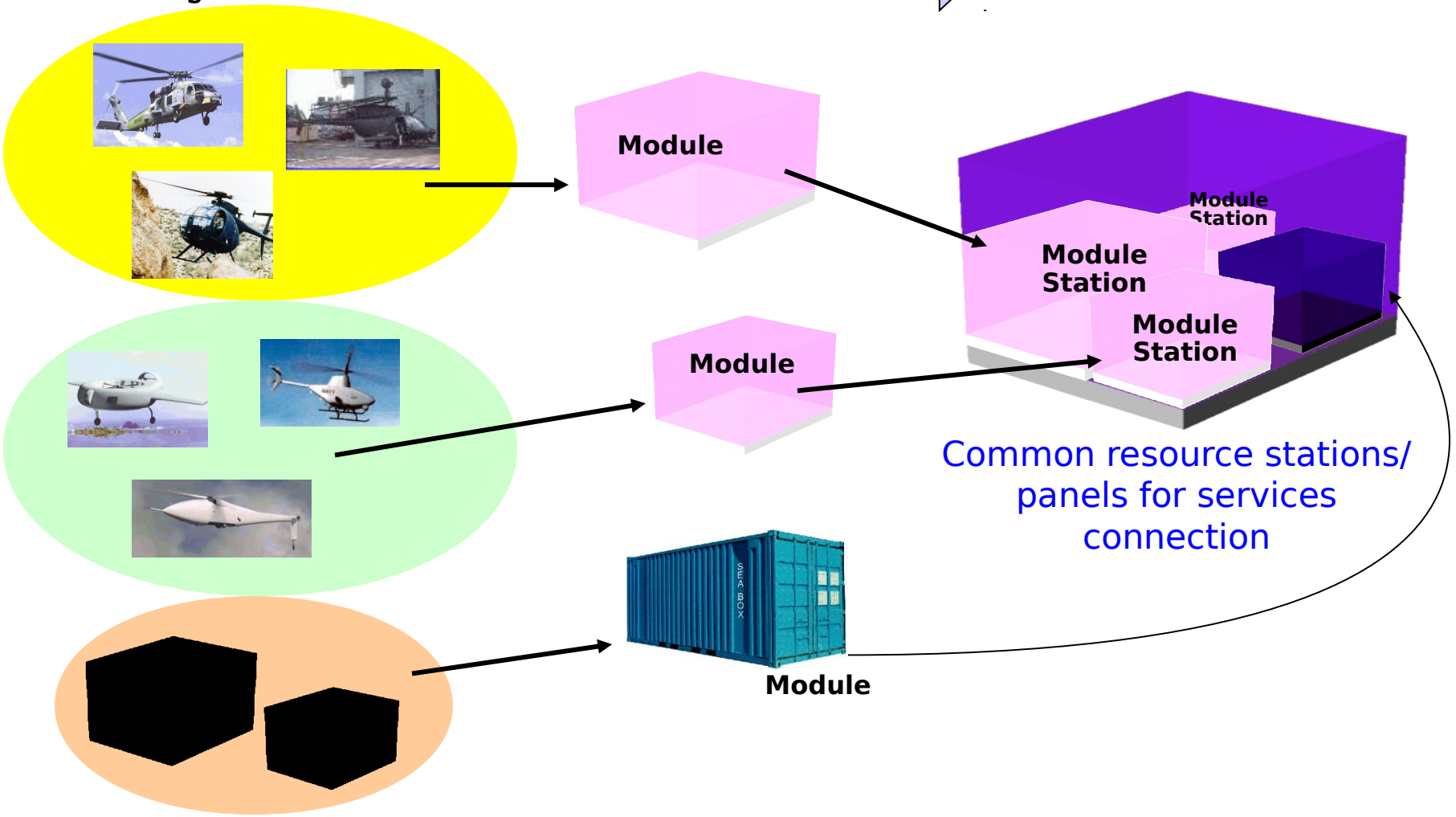
MISSION PACKAGE

- Modules
- Manned Aircraft
- UVs
- Offboard Sensors
- Mission Crew

FOCUSED MISSION

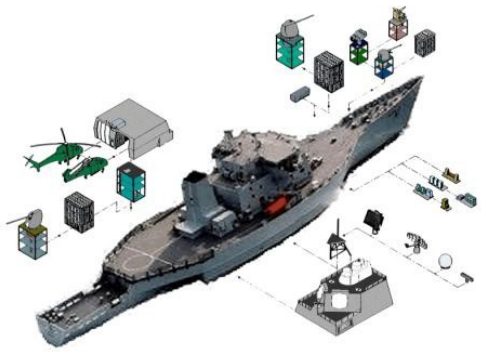
Module / Seaframe Interface Concept

Systems → **Modules** → **Seaframe Zone**



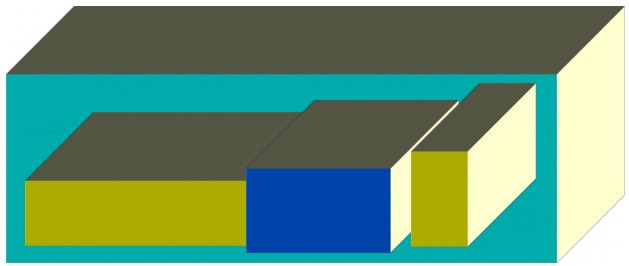
Mission Package Development & Modules

Spectrum of Modularity



"Tightly coupled" Zones and Modules

Module Box



Large Mission Bay Zone with Greater Tolerances

Process to Select and Validate Mission Packages for Each Warfare Area (MIW, ASW, SUW)

Littoral Gaps: Quantified

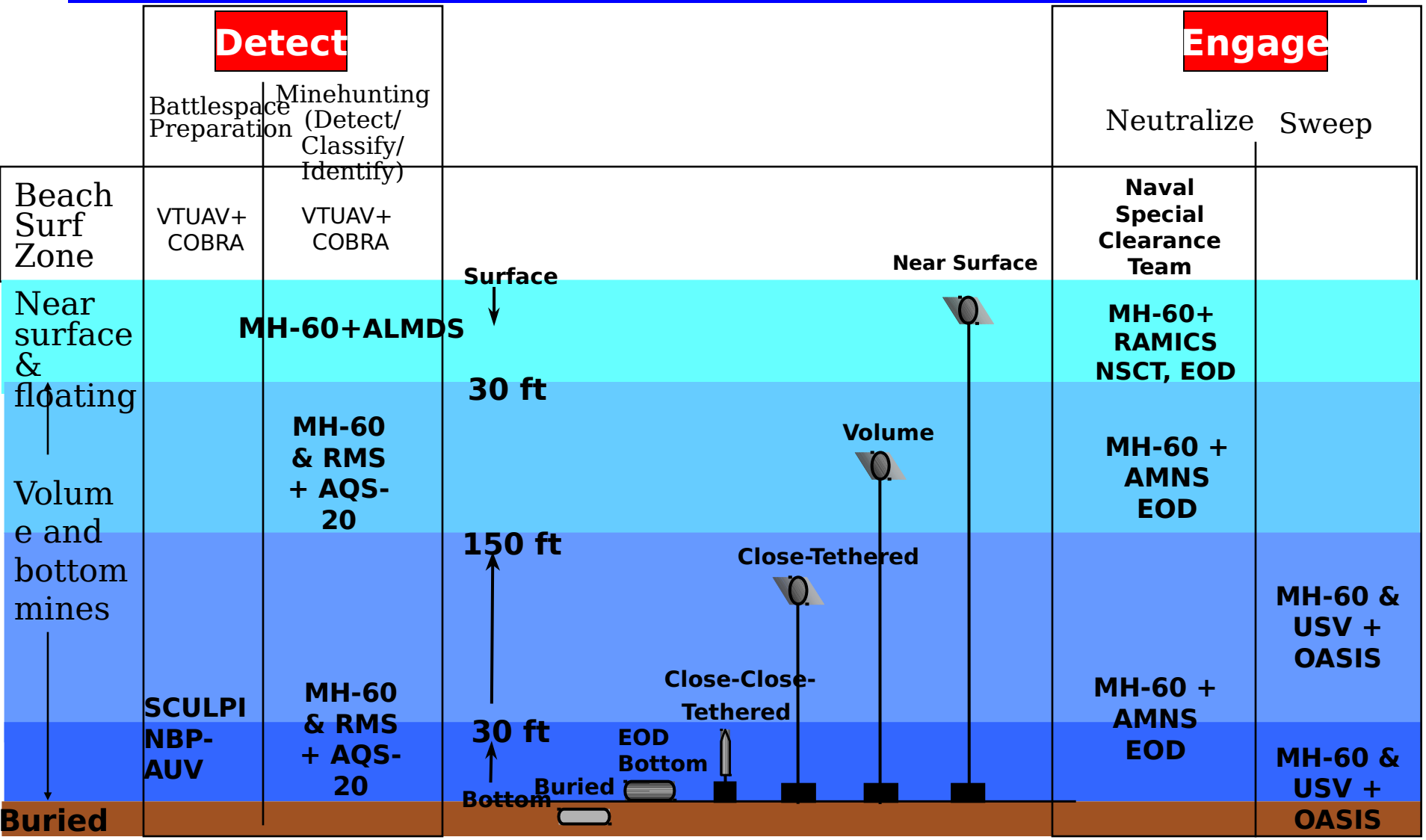
Mission Profiles: Identified

Required Capabilities: Determined

Mission Modules: Selected

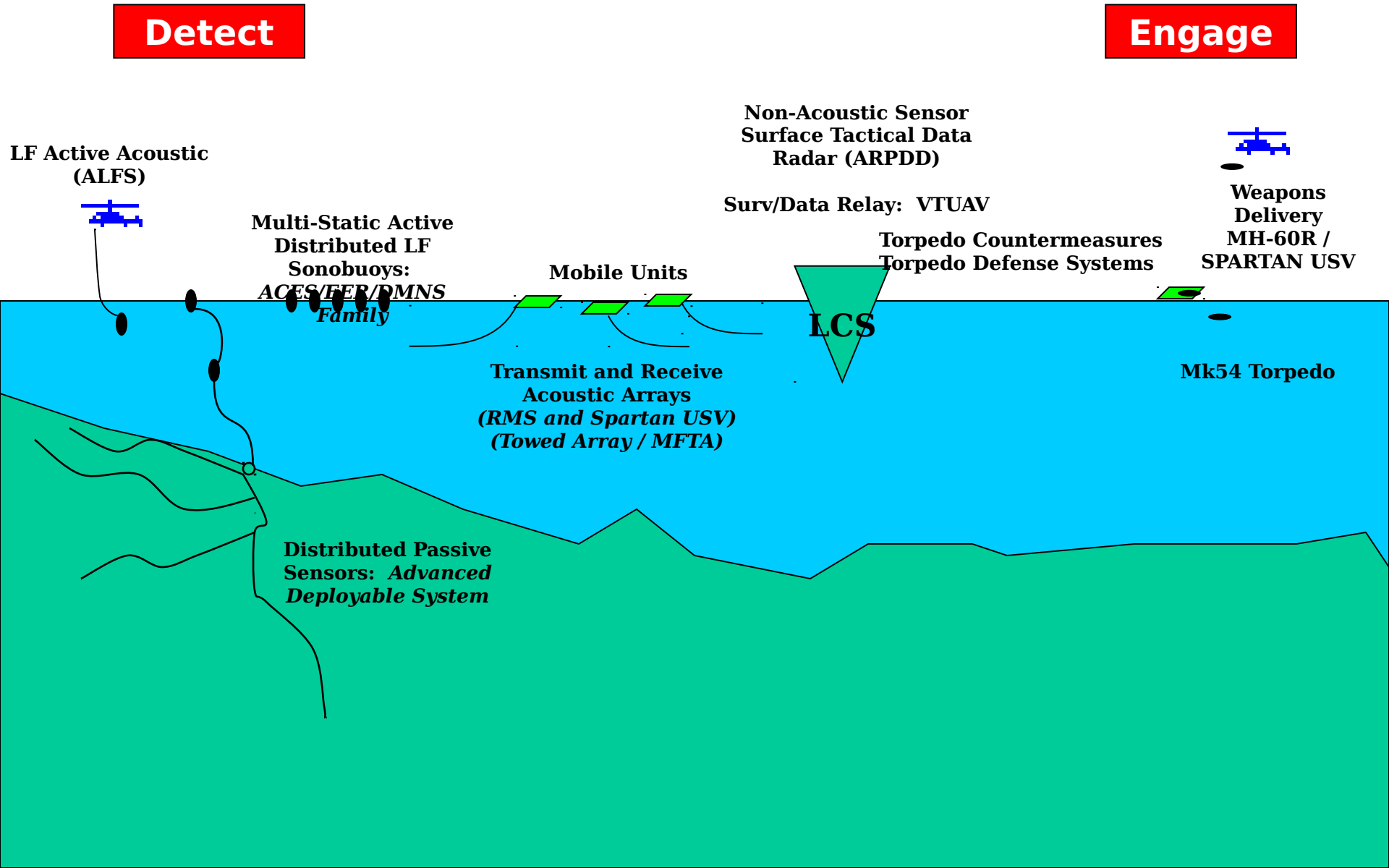
Wargaming / Analysis: Validation

Target LCS Flight 0 MIW Mission Package



* **NOTE : Depth Coverages Vary with System and Mine Type**

Target LCS Flight 0 Ship 2
ASW Mission Package


Detect
Engage
LF Active Acoustic (ALFS)
Multi-Static Active Distributed LF Sonobuoys: ACES/EER/DMNS Family
Non-Acoustic Sensor Surface Tactical Data Radar (ARPDD)
Surv/Data Relay: VTUAV
Mobile Units
Torpedo Countermeasures Torpedo Defense Systems
Weapons Delivery MH-60R / SPARTAN USV
LCS
Transmit and Receive Acoustic Arrays (RMS and Spartan USV) (Towed Array / MFTA)
Mk54 Torpedo
Distributed Passive Sensors: Advanced Deployable System

CONOPS
Modular Mission Capabilities

Mine Counter Measure package

- ✓Provide organic punch through capability.
- ✓Search, map, avoid with limited neutralization.
- ✓Support remote & autonomous UVs and operate helos.
- ✓Massed LCS Division = Dedicated MCM capability.

- ✓Integrated with multiple off-board sensor systems.
- ✓Automatic on-board processing.
- ✓Helicopter(s).
- ✓Permits dedicated LCS ASW division.

Small boat prosecution package

- ✓"Need to engage from close aboard to over-the-horizon".
- ✓Stabilized gun and missile system.
- ✓Integrated with EO/IR system.
- ✓Include non-lethal capabilities.
- ✓Helos & off-board systems

Inherent missions

- ✓SOF
- ✓Maneuver, logistics, replenishment
- ✓NEO
- ✓MIO
- ✓Medical …

Missions made possible by the removal of focused mission modules .

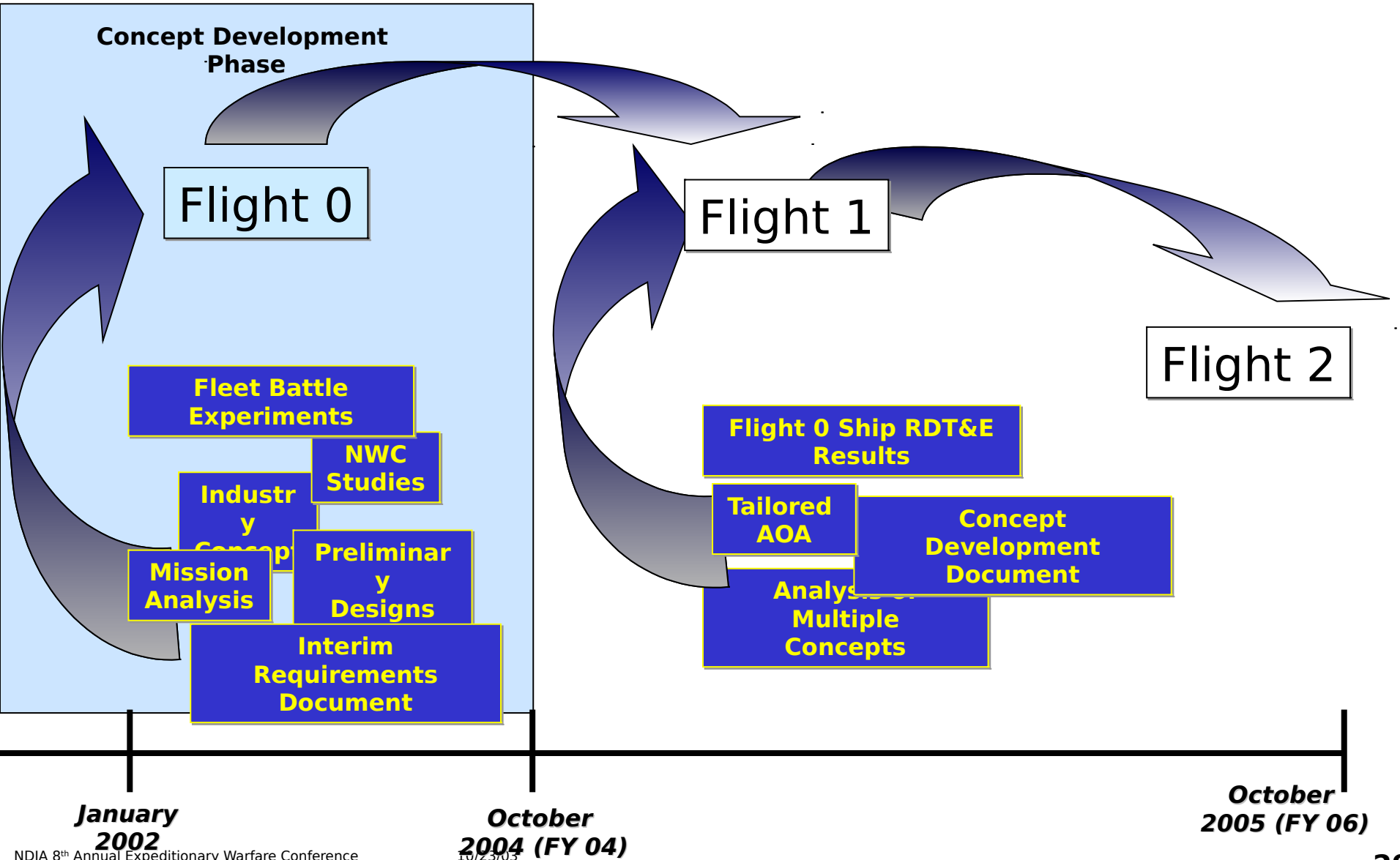
LCS Mission Systems and Ship Integration Team

FY03 LCS Mission Systems and Ship Integration (MSSI) IPT

- Integrated Product Team (IPT) comprised of Government and Industry Reps
- Reports to the LCS Program Manager
- Integration efforts:
  - Develop & maintain Technical Architecture for LCS Mission Systems (Interface Control Document (ICD))
    - ★ Targeted Interface Development
      - » JUSC2 ACTD, Others
  - Spiral Development & Technology Management
    - ★ Flight 0 Mission Module

Goal: Develop a LCS Technical Architecture (Seaframe to Mission Module ICD) sufficiently "open" to insure mission reconfigurability and lifecycle technology adaptability

LCS Developmental Process is Continuing



LCS Experimentation Battle Lab Team

Oversight Team

Fleet Input COMNAVSURFOR

SEA 05D
CDR Al Gaiser, Pete Czapiewski
SEA 03
Jim Thurber
SEA 06
TBD

Dick Vogelson
CDR Jim Malloy
Jeff Kent

PEO LMW
CAPT Walter Wright
PMS-420

PEO IWS
CAPT Al Greco
Adrian Eversoll

PEO SHIPS
PMS 501
Bill Schoenster, Todd Tompkins

PEO C4I
Chuck Auxter

AIR 4
Bob Jackson
Mike Van Ryswick

Execution Team

Mark Shiffler
Ken Montgomery

Chris Colby

WB &B
Brian Schires
Larry Zimmerman

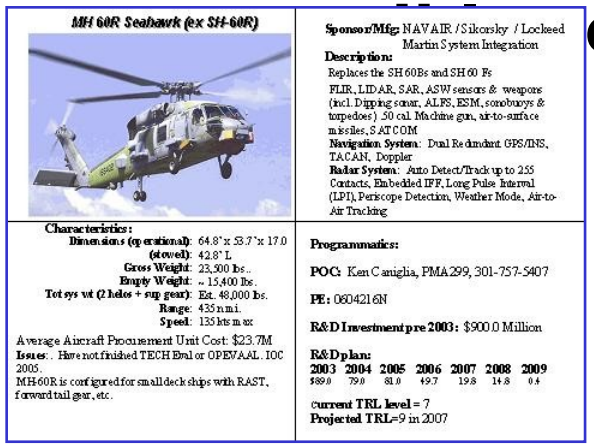
Rob McDonald ,
Mario Berenger,
Jose Velez

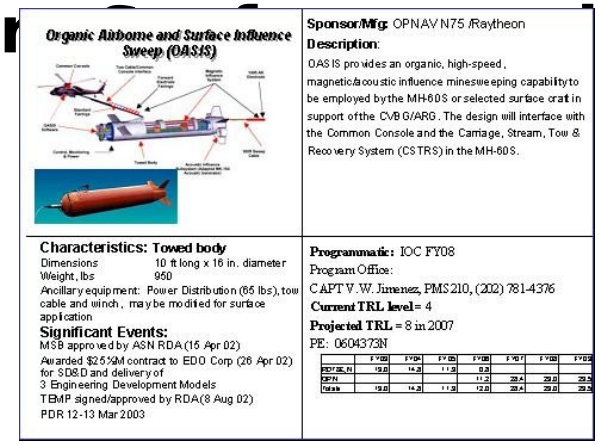
Tom Owen

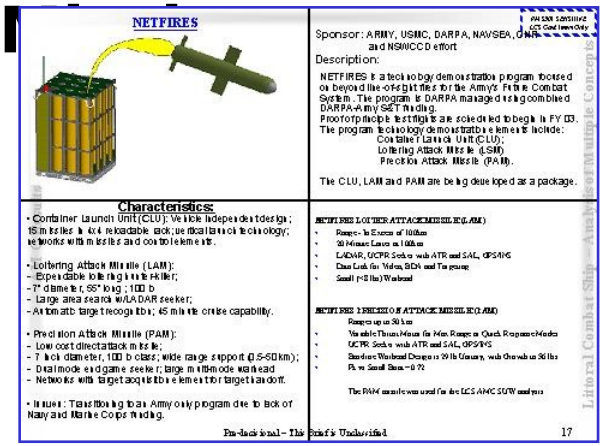
NWDC
CDR Todd Haeg
Dave Lumsden

Technology Management

- Based on CONOPS, conducted targeted Technology surveillance
  - PEO's and Naval War College
  - Numerous offsites for technology "harvesting"
  - Ongoing
- Evaluation of possible candidates for LCS Mission Architecture
- Facilitated by LCS Mission Systems and Ship Integration IPT (MSSIT)
- Fed to analysis efforts as inputs for


MH 60R Seahawk (ex SH-60R)
Sponsor/Mfg: NAVAIR / Sikorsky / Lockeed Martin System Integration
Description:
Replaces the SH 60Bs and SH 60 Fs
FLIR, LIDAR, SAR, ASW sensors & weapons (incl. Dipping sonar, ALFS, ESM, sonobuoys & torpedoes), .50 cal. Machine gun, air-to-surface missiles, SATCOM
Navigation System: Dual Redundant GPS/INS, TACAN, Doppler
Radar System: Auto Detect/Track up to 255 Contacts, Embedded IFF, Long Pulse Interval (LPI), Periscope Detection, Weather Mode, Air-to-Air Tracking
Characteristics:
Dimensions (operational): 64.8' x 53.7' x 17.0
(stowed): 42.8' L
Gross Weight: 23,500 lbs.
Empty Weight: ~ 15,400 lbs.
Tot sys wt (2 helos + sup gear): Est. 48,000 lbs.
Range: 435 n.mi.
Speed: 135 kts max
Average Aircraft Procurement Unit Cost: $23.7M
Issues: . Have not finished TECH Eval or OPEVAAL. IOC 2005. .
MH-60R is configured for small deck ships with RAST, forward tail gear, etc.
Programmatics:
POC: Ken Caniglia, PMA299, 301-757-5407
PE: 0604216N
R&D Investment pre 2003: $900.0 Million
R&D plan:
2003 2004 2005 2006 2007 2008 2009
$89.0 79.0 81.0 49.7 19.8 14.8 0.4
current TRL level = 7
Projected TRL=9 in 2007


Organic Airborne and Surface Influence Sweep (OASIS)
Sponsor/Mfg: OPNAV N75 /Raytheon
Description:
OASIS provides an organic, high-speed, magnetic/acoustic influence minesweeping capability to be employed by the MH-60S or selected surface craft in support of the CVBG/ARG. The design will interface with the Common Console and the Carriage, Stream, Tow & Recovery System (CSTRS) in the MH-60S.
Characteristics: Towed body
Dimensions 10 ft long x 16 in. diameter
Weight, lbs 950
Ancillary equipment: Power Distribution (65 lbs), tow cable and winch , may be modified for surface application
Significant Events:
MSB approved by ASN RDA (15 Apr 02)
Awarded $26.5M contract to EDO Corp (26 Apr 02) for SD&D and delivery of
3 Engineering Development Models
TEMP signed/approved by RDA(8 Aug 02)
PDR 12-13 Mar 2003
Programmatic: IOC FY08
Program Office:
CAPT V.W. Jimenez, PMS 210, (202) 781-4376
Current TRL level = 4
Projected TRL = 8 in 2007
PE: 0604373N


NETFIRES
Sponsor: ARMY, USMC, DARPA, NAVSEA, ONR and NSWCCD effort
Description:
NETFIRES is a technology demonstration program focused on beyond-line-of-sight fires for the Army's Future Combat System. The program is DARPA managed using combined DARPA-Army S&T funding.
Proof of principle test flights are scheduled to begin in FY 03.
The program technology demonstration elements include:
Container Launch Unit (CLU);
Loitering Attack Missile (LAM);
Precision Attack Missile (PAM).
The CLU, LAM and PAM are being developed as a package.
Characteristics:
• Container Launch Unit (CLU): Vehicle independent design; 18 missiles in 4x4 reloadable rack; uses commercial technology; networks with missiles and control elements.
• Loitering Attack Missile (LAM):
- Expendable loitering kinetic killer;
- 7" diameter, 65" long ; 100 lb
- Large area search w/ADAR seeker;
- Automatic target recognition; 45 minute on-station capability.
• Precision Attack Missile (PAM):
- Low cost direct attack missile;
- 7 inch diameter, 100 lb class; wide range support (0.5-50 km);
- Dual mode end game seeker; large multimode warhead
- Networks with target acquisition elements for target handoff.
• Issues: Transitioning to an Army only program due to lack of Navy and Marine Corps funding.
Pre-decisional – This Briefis Unclassified
17

LCS Flight 0 Mission Modules - PB04

MIW Module Package – Ship 1

MIW Mission Modules	QTY
RMS (AN/WLD-1)	2
SPARTAN	1
MIW Package	1
MH-60S	1
ALMDS	1
AQS-20A	2
AMNS	1
RAMICS	1
OASIS Sweep	1
LMRS	1 set (2)
Explosive Ordnance Disposal Det or Naval Special Clearance Team	1
BPAUV	3
REMUS / SCULPIN	3

ASW Module Package – Ship 2

ASW Mission Modules	QTY
SPARTAN USV	2
SPARTAN ASW Package	2
MH-60R Helicopter	1
Torpedo	set
Sonar	set
Sonobuoys	set
ACES Family (EER) / Multistatic System (DMNS)	1
Torpedo Countermeasures	1
ASW RMV	2
Towed Arrays (Emit / Receive)	2 sets

Small, Fast, Modular Ship Evolution

Pre FY 01

1985: Navy establishes requirements (TOR) for Small Fast Ship (PXM)

1988-1991: NAVSEA conducts concepts studies on Scout Fighter concept (small, fast, deployable ship)

July 1993: PEGASUS Class PHMs decommissioned

June 99: Global War Game Introduces concept of a small fast re-configurable ship in littoral (Streetfighter)

2000/01: NWDC/DARPA Capabilities for Navy After Next Wargame plays Small Fast reconfigurable Ship w/ off-board systems against anti-access littoral threat

Oct 00: Navy initiates analysis of MCM(X) with options that support off-board systems

FY 01

Jan 2001: OPNAV assessment process and IWARS shows gaps in littoral access for ASW, MIW, SUW

Feb 01: Navy and Coast Guard enter MOA for maritime shared interests

Sep 01: Navy/Army commences Lease on Joint Venture (HSV-X1)

Dec 01: Navy initiates year long demonstration with Norwegian Navy Ship SKJOLD

July 01: Global wargame shows value of small fast ship in littoral environment (Streetfighter)

Aug 01: QDR 2001 directed deterrence in littorals capabilities

Oct 02: Navy Awards contract for HSV-2 (SWIFT)

June-July 02: Navy-Marine Corps Global ConOps & Sea Power 21 promulgated
Sept 02: National Security Strategy directs Force Transformation

FY 02

Nov 01: USD (AT&L) added LCS to Family of Surface Combatants

Dec 01: CNO vision - Family of Surface Combatants (DDX, CGX, LCS)

Jan 02: Homeland Security Mission established;
PCs life extension program started

Jan 02: Future Surface Combatant Requirements Document initiated

Mar 02: Mission Capability Analysis confirmed "gaps"

May 02: DPG directed LCS introduction

June 02: Commander, Naval Surface Forces Concept Guidance

June 02: Naval War College LCS Characteristics Study

June 02: Navy identifies resources for HSV-2 (SWIFT)

FY 03

Oct 02: Congress funds X-craft and HSWAC experimental craft

Oct 02: Defense Appropriation Act (Public Law 107-248) added $30M for program

Dec 02: "New Program Start" authorization via Defense Authorization Act (Public Law 107-314)

Feb 03: Formal solicitation for Industry design proposals

Feb 03: Commander Fleet Forces Command approves LCS ConOps

Feb 03: Navy Approved Preliminary Interim Requirements Document issued

Mar 03: Mission Capabilities Package (PR 05) confirmed "gap"

APR 03: Analysis of Multiple Concepts (Phase II) Concept of Employment/ Mission Analysis

July- Aug 03: Preliminary design contract(s) award

FY 04 and beyond

May 04: Down select to 1 or 2 industry teams for Final Design

Oct 03: Analysis of Multiple Concepts completes (Phase III)

May 04: Milestone "A" Decision

JAN 05: FLT 0 First Hull Procured

Mar 05: Concept studies for Flight 1

July 05: Analysis of Alternatives for Flight 1

Dec 05: FLT 0 Second Hull Procured

Jan 07: FLT 0 First Hull Delivered

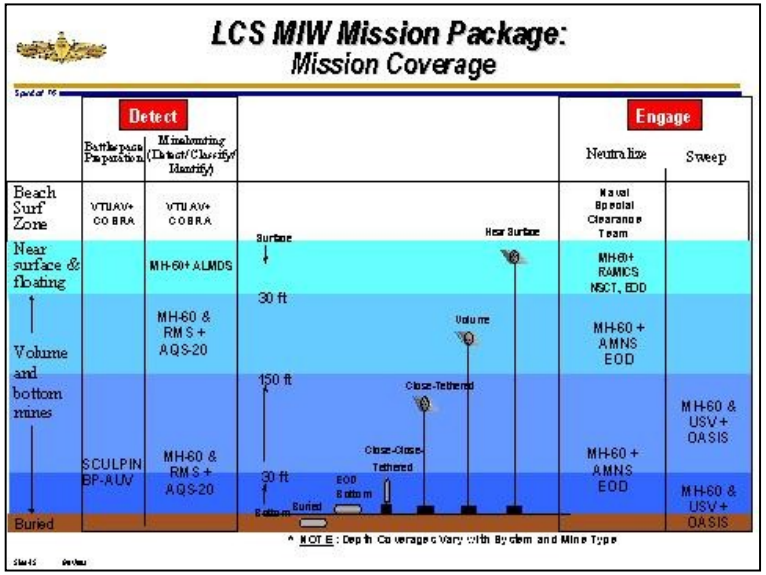
FY 07: Milestone "B" Flight I

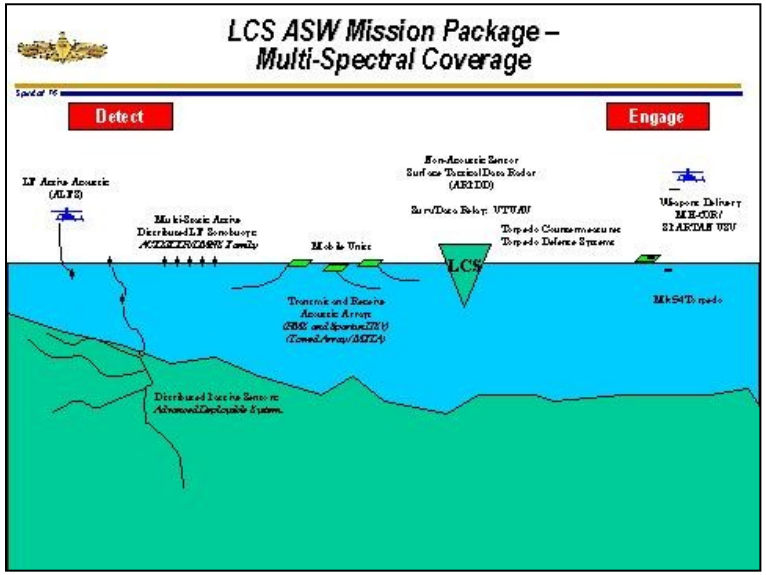
Dec 07: FLT 0 Second Hull Delivered

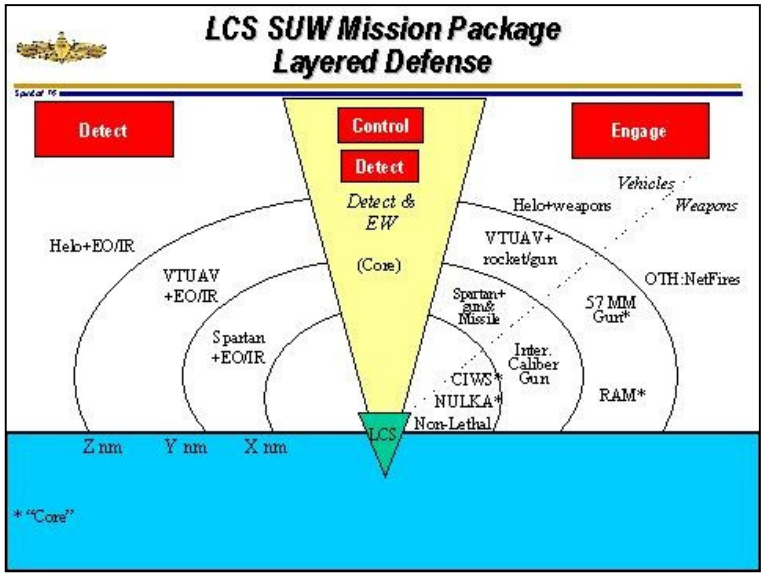
FY 08: FLT 1 Procured (3 Hulls)

LCS Flight 0 Mission Modules – PR05

From Mission Module Offsites







CONOPS
Modular Mission Capabilities

Mine Counter Measure package

✓Provide organic punch through capability.

✓Search, map, avoid with limited neutralization.

✓Support remote & autonomous UVs and operate helos.

✓Massed LCS Division = Dedicated MCM capability.

✓Integrated with multiple off-board sensor systems.

✓Automatic on-board processing.

✓Helicopter(s).

✓Permits dedicated LCS ASW division.

Small boat prosecution package

✓"Need to engage from close aboard to over-the-horizon".

✓Stabilized gun and missile system.

✓Integrated with EO/IR system.

✓Include non-lethal capabilities.

✓Helos & off-board systems

Inherent missions

✓SOF

✓Maneuver, logistics, replenishment

✓NEO

✓MIO

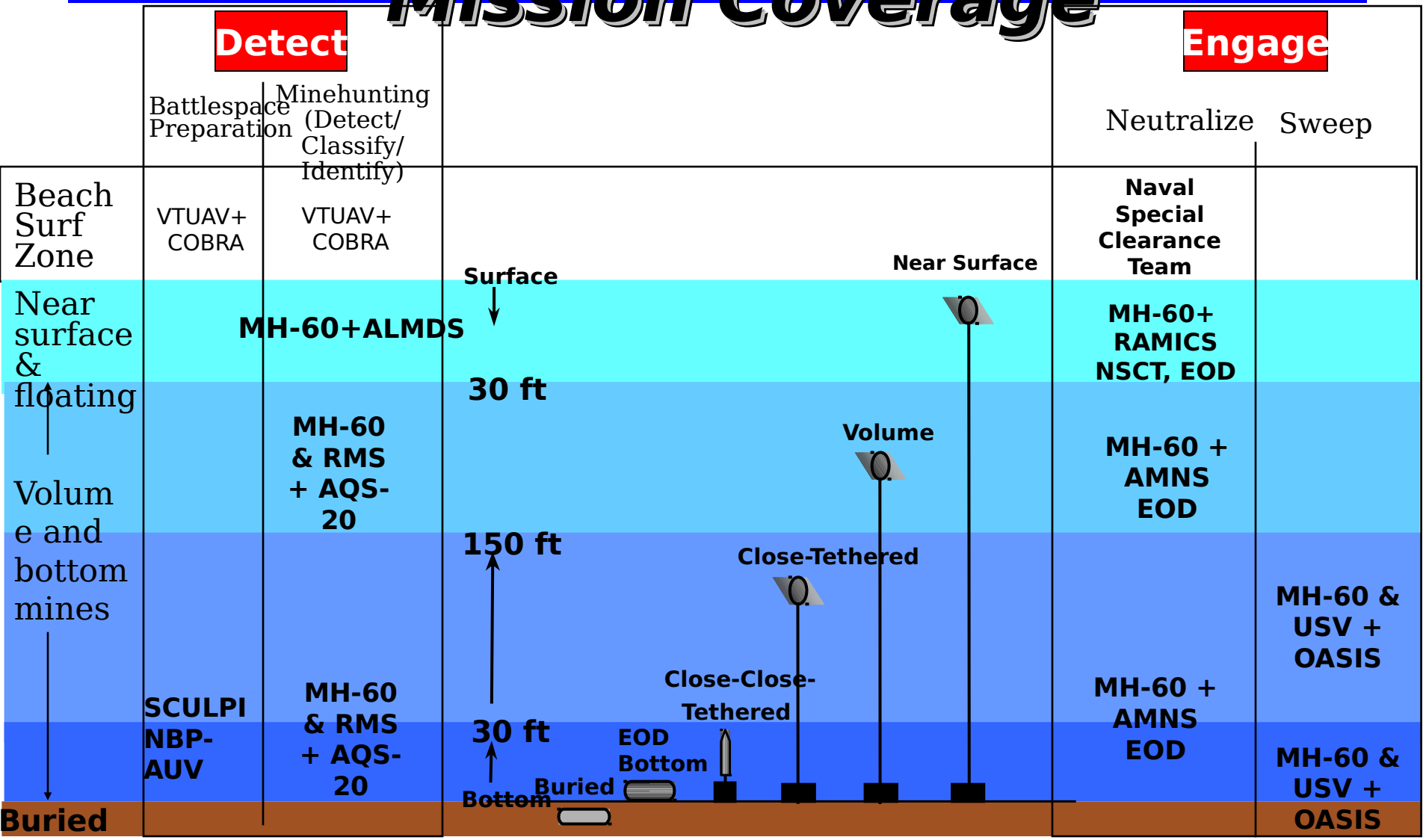
✓Medical …

Missions made possible by the removal of focused mission modules .

Flight 0 Mission Package Selection

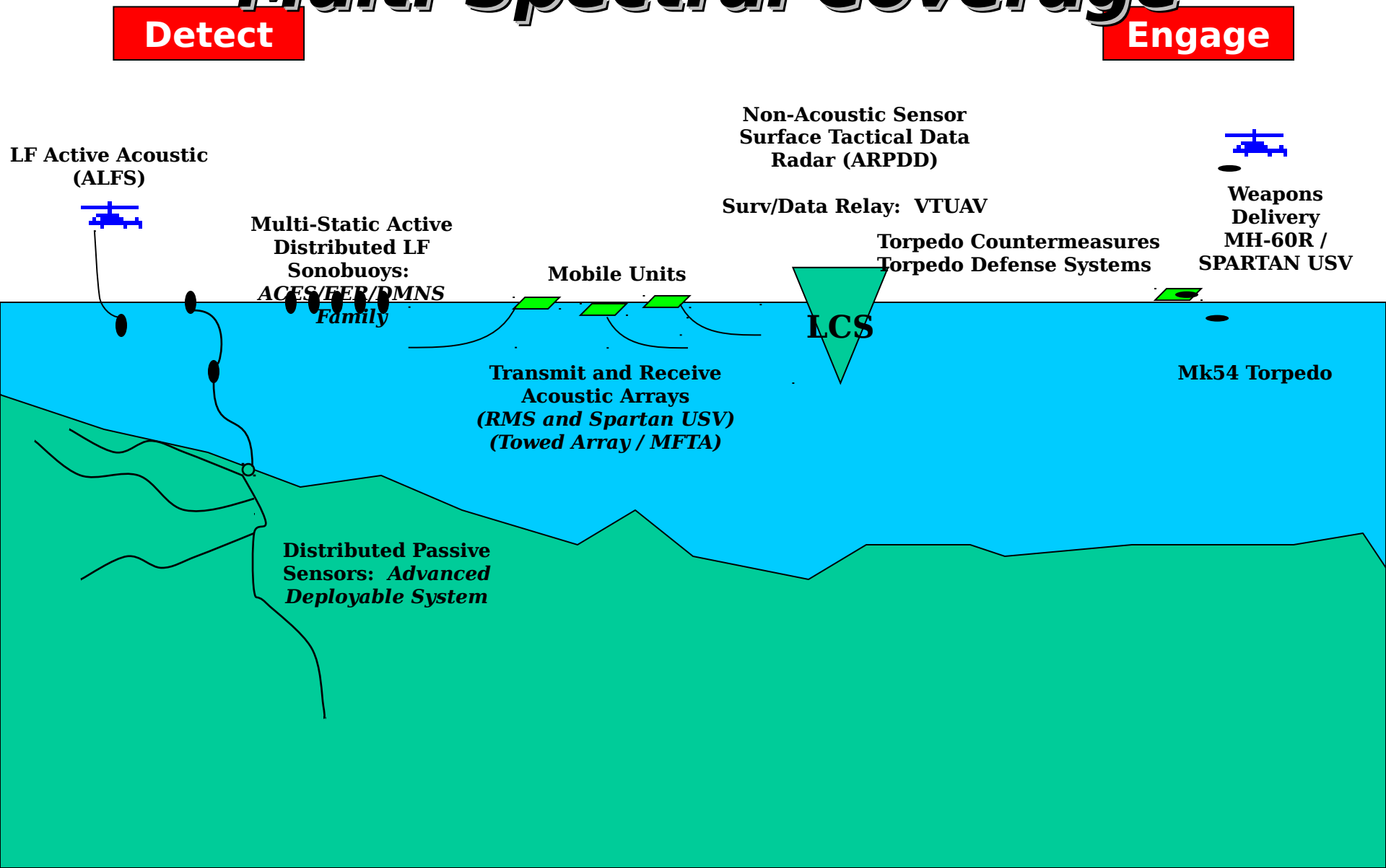
- Need to make rapid programming decisions supporting Mission Packages for Flight 0 due to programming cycle and aggressive LCS schedule (FY07 ship 1 delivery)
- A Mission Module “Offsite” analysis process conducted
  - Over course of 5 months, over 150 total participants
  - COMNAVSURFOR, CFFC, NWDC, Fleet, resource sponsor, technical community participants
  - Numerous studies as input, including:
    - ★ CONOPS
    - ★ Technology Management study
    - ★ NSWC DD Analysis of Multiple Concepts
    - ★ SPA Mission Analysis
- Necked down approximately 1000 systems to ~30
- Culminating in Mission Module Offsite #3
  - Focused on Mission Package capability definition

LCS Flight 0 MIW Mission Package: PR05 Mission Coverage



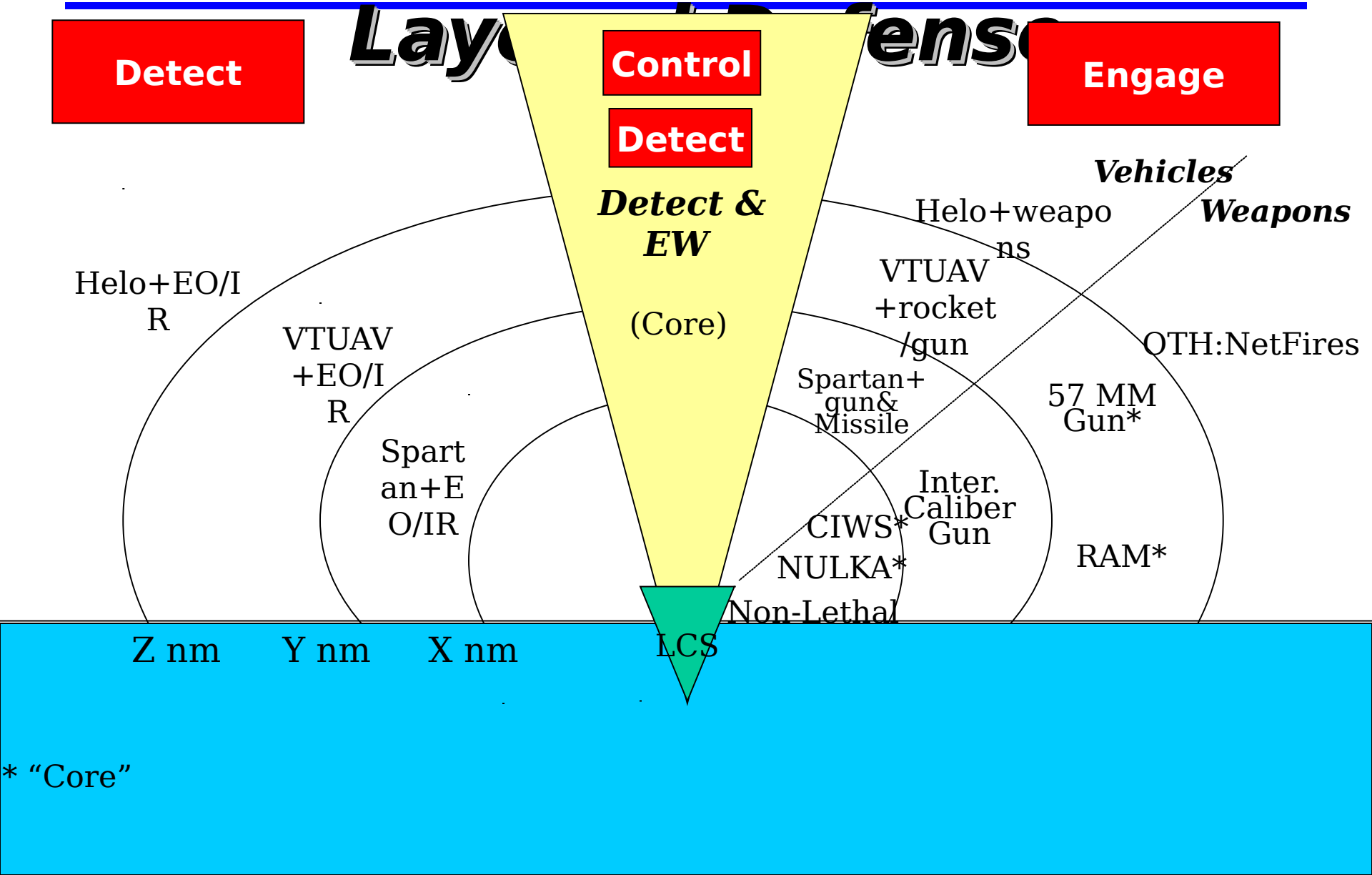
* **NOTE : Depth Coverages Vary with System and Mine Type**

LCS Flight 0 ASW Mission Package: PR05
Multi-Spectral Coverage


Detect
Engage
LF Active Acoustic (ALFS)
Multi-Static Active Distributed LF Sonobuoys: ACES/EER/DMNS Family
Non-Acoustic Sensor Surface Tactical Data Radar (ARPDD)
Surv/Data Relay: VTUAV
Mobile Units
Torpedo Countermeasures Torpedo Defense Systems
Weapons Delivery MH-60R / SPARTAN USV
LCS
Transmit and Receive Acoustic Arrays (RMS and Spartan USV) (Towed Array / MFTA)
Mk54 Torpedo
Distributed Passive Sensors: Advanced Deployable System

Mission Package: PR05

Layered Defense



* “Core”

LCS Flight 0 Mission Modules (PR05)

MIW Package

MIW Mission Modules	QTY
RMS (RMV+equipment)	2
AQS-20A	2
SPARTAN (core)	1
OASIS Sweep	1
MH-60S with	1
OASIS Sweep	2
ALMDS	2
AQS-20A	2
RAMICS	2
AMNS	2
Explosive Ordnance Disposal Det or Naval Special Clearance Team	1
VT-UAV	1 set (3 vehicles)
COBRA	2
ARPDD	1
BPAUV (Set)	1
AQS-20A	1
SCULPIN/REMUS (set)	1

ASW Package

ASW Mission Modules	QTY
SPARTAN	2
ASW Package	2
VTUAV	1 set (3 vehicles)
ARPDD	1
MH-60R with	1
Torpedo	set
Sonar	set
Sonobuoys	set
ACES Family (EER/IEER/AEER)	1
Torpedo Countermeasures	1
ADS	1
RMS (RMV+equipment)	2
Towed Array	2

SUW Package

SUW Mission Modules	QTY
SPARTAN with EO/IR (core)	2
Gun (GAU 7) package	1
Hellfire or LOCGIR package	1
VTUAV with EO/IR	3
Rocket/Gun/Missile	set
MH-60R with	1
EO/IR	set
Gun/Rockets	set
Hellfire	set
Netfires	1
Intermediate Caliber Gun Module	2
Non-Lethal Weapon	2